



# \*Isomers

Goal: Explore 2 types of isomers: structural  
and geometric

- \* Also known as constitutional isomers
- \* They have the same empirical formula meaning same number of atoms but they are arranged in different ways.
- \* A branch can be moved to different position to obtain a new isomer.
- \* If a functional group is present, you would move it around to different positions.

## \* Structural isomers

\* Using your model kit build pentane using only carbon atoms. Don't worry about H's.

\* You should have:



Name it.

\* Now remove the end carbon: this is a methyl group. Place it as a branch and name your compound.

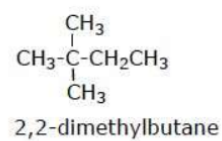
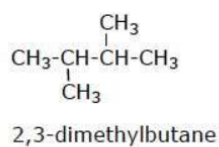
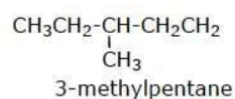
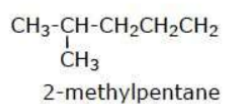
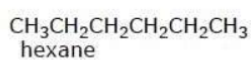
\* Can you make any other changes? Why or why not?

## \* Exploring isomers of pentane

\*How many isomers of hexane can you get?

\*Name them.

**C<sub>6</sub>H<sub>14</sub> : 5 isomers**



\*Explore Hexane

\* We can't place a methyl group on C #1 or an ethyl on C#2. Why?

\* Make sure you number the parent chain properly so you are not repeating isomers.

\* Make sure there are always 4 bonds around a Carbon.

\* Tips

- \* Also called stereoisomers
- \* 2 identical chains but differ by their geometric shape.
- \* They have the same name and the same position for branches.
- \* A “cis” or “trans” can be added to the name to indicate a specific geometry
- \* It only applies for certain compounds ( some alkenes and some cyclic) because we can't rotate the bond.

## \* Geometric isomers

- \* We need a 3D structure to see the difference.
- \* Line structural diagram are helpful to draw geometric isomers
- \* Exploring 2-butene.
- \* Build the model using C's and H's.
- \* Use two springs for a double bond.
- \* A small stick between H and C
- \* A large stick between C and C

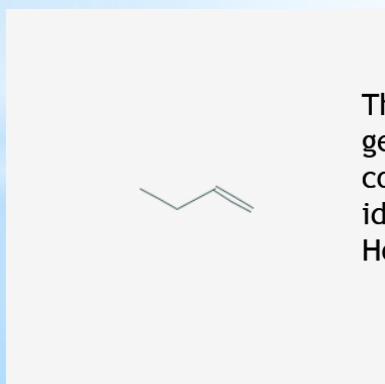
\* Cis or trans



“Chair Configuration” Groups come off opposite side of double bond: this is trans-2-butene

“boat configuration” Groups come off the same side of the double bond: this is cis-2-butene

Trans-2-butene ( same as 1)



This one is called 1-butene and it doesn't have a geometric isomer because it has the same group coming off the first carbon of the double bond. ( 2 identical H's )  
However it is a structural isomer of 2-butene



- \* Cis: the groups come off the same side
- \* Trans: the groups come off opposite sides
- \* Cis and trans isomers differ by their physical properties: boiling point, freezing point, solubility, etc...
- \* They could undergo reactions differently (speed of reaction can differ)
- \* Usually trans are more stable

## \* Comparison

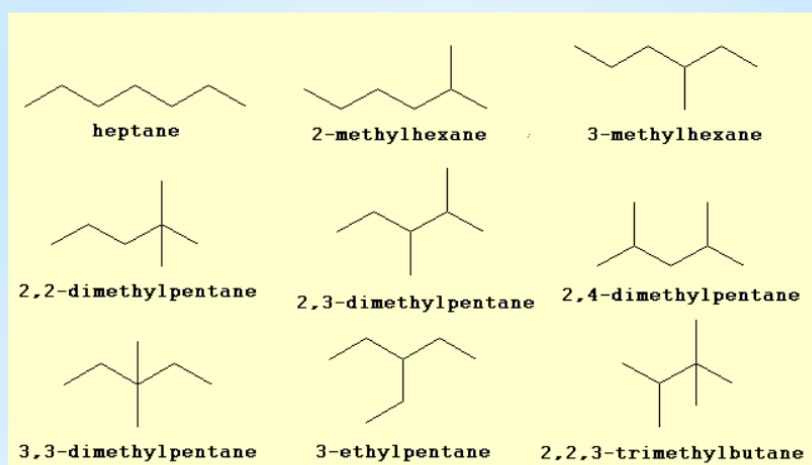
\* Draw and name all the isomers of heptane (9 in total)

\* Draw and name the stereoisomers for:

n-hexene ( there are 4)

\*the n means it is a straight chain ( no branches)

\* **Group work**



## \* Isomers of heptane

Cis trans isomers of n- hexene

